

**CLAIMS**

1. A method of fault classification in a plasma process chamber powered by an RF source, comprising the steps of:

5 a) running a plurality of different baseline processes on the chamber,

(b) in respect of each baseline process, determining the magnitudes of a plurality of Fourier components of delivered RF power and storing the magnitudes as reference  
10 data for that baseline process, and

c) when a fault is to be classified, repeating at least one of the said baseline processes according to a predetermined decision tree to classify the fault by comparing the current magnitudes of the said Fourier  
15 components with the corresponding reference data.

2. A method as claimed in claim 1, wherein steps (a) and (b) are performed prior to a production run, wherein the method further comprises monitoring the chamber for faults  
20 during the production run, and wherein step (c) is performed upon detection of a fault during the production run.

3. A method as claimed in claim 1, wherein steps (a) and (b) are performed prior to scheduled downtime of the chamber  
25 and step (c) is performed after the scheduled downtime and prior to a production run.

4. A method as claimed in claim 1, wherein the different baseline processes comprise a first baseline process  
30 including the same gases as those used in a production run

for which the chamber is used, a second baseline process running an inert gas plasma, and a third baseline process running at sufficiently low power that no plasma ignites.

5 5. A method as claimed in claim 1, wherein the Fourier components are those of the voltage, current and phase of the delivered RF power.

6. A method as claimed in claim 1, wherein each baseline  
10 process is carried out on a test substrate.

7. A method as claimed in claim 1, wherein each baseline process is carried out on a product wafer.

15 8. A method as claimed in claim 1, wherein each baseline process is run in the absence of a substrate.

9. A method of comparing two plasma process chambers powered by an RF source, comprising the steps of:

20 a) running a plurality of different baseline processes on one of the chambers,

b) in respect of each baseline process, determining the magnitudes of a plurality of Fourier components of delivered RF power and storing the magnitudes as reference data for  
25 that baseline process,

c) running at least one of the said baseline processes on the other chamber according to a predetermined decision tree to classify any differences between the chambers by comparing the current magnitudes of the said Fourier  
30 components with the corresponding reference data.

10. A computer-readable storage medium bearing program code adapted in execution on a computer to perform the following steps on a plasma process chamber powered by an RF source:

5       a) run a plurality of different baseline processes on the chamber,

         (b) in respect of each baseline process, determine the magnitudes of a plurality of Fourier components of delivered RF power and store the magnitudes as reference data for that  
10 baseline process, and

         c) when a fault on the chamber is to be classified, repeat at least one of the said baseline processes according to a predetermined decision tree to classify the fault by comparing the current magnitudes of the said Fourier  
15 components with the corresponding reference data.

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